

First record of a schizomid, *Stenochrus portoricensis* (Schizomida: Hubbardiidae), in Slovakia

Jana Christophoryová, Anna Šestáková, Miroslav Krumpál & Peter Fend'a

doi: 10.5431/aramit4506

Abstract. The discovery of *Stenochrus portoricensis* Chamberlin, 1922 is the first record of the order Schizomida in Slovakia. Juvenile specimens and adult females were found in heated greenhouses in the Botanical Garden of the Comenius University in Bratislava, Slovakia. The main morphological characters of juveniles and adult females were studied and photographed.

Keywords: Central Europe, faunistics, greenhouse, introduced species, short-tailed whipscorpion

The order Schizomida is a small group of arachnids, currently represented by two recent families: Proto-schizomidae Rowland, 1975 with two genera and 12 species; and Hubbardiidae Cook, 1899 with 48 genera and 271 species worldwide (Harvey 2007, Armas 2010, Monjaraz-Ruedas 2012). Schizomids can be found in leaf litter, under rocks, in caves and other subterranean voids, in many tropical and subtropical regions of the world. Some species have been recorded from greenhouses and other artificial environments in Europe, demonstrating their ability to withstand long-distance transport by human commerce (Harvey 2003). Three species have previously been recorded from greenhouses in Europe. *Schizomus crassicaudatus* (O. P.-Cambridge, 1872) was introduced from Sri-Lanka into France. *Zomus bagnallii* (Jackson, 1908) was introduced from Southeast Asia, the Seychelles or Mauritius into Great Britain (Harvey 2003, Blick 2006). *Stenochrus portoricensis* Chamberlin, 1922 has been introduced into Great Britain, Spain (Canary Islands) and the Czech Republic (Harvey 2003, Blick 2006, Korenko et al. 2009). All of the specimens from Europe were collected from heated greenhouses. Undetermined schizomids have been collected from two greenhouses in Germany (Cokendolpher et al. 2006).

Material and methods

The schizomids were found in two heated greenhouses (temperature about 26 °C) situated in the same part of the Botanical Garden of the Comen-

ius University in Bratislava (Fig. 1A), Slovakia (grid reference number of the Databank of Slovak Fauna 7868; 48°08'49.2"N; 17°04'20.97"E; 148 m a.s.l.; lgt. J. Christophoryová, P. Fend'a, K. Krajčovičová & A. Šestáková). Thirteen juvenile specimens were extracted from soil samples using Tullgren funnels (9 May 2012: 3 juveniles, 7 June 2012: 2 juveniles, 22 November 2012: 8 juveniles). Seven females were individually collected (22 November 2012) under the stones (Fig. 1B) and two were extracted from soil samples (22 November 2012).

Two juveniles and five females were dissected, studied as permanent slide mounts, and photographed using a Leica DM1000 stereoscopic microscope with an ICC50 Camera Module (LAS EZ application 1.8.0). Other specimens were preserved in 80 % or 96 % ethanol and were photographed using a digital camera CANON EOS 1100D connected to a Zeiss Stemi 2000-C stereomicroscope. The female genitalia were dissected in 96 % ethanol and macerated using NaOH solution, after which they were mounted on a permanent slide in Swan's fluid. Digital images were montaged using the "CombineZP" image stacking software. The specimens were identified by J. Christophoryová and M. Krumpál. The material is deposited in the collection of the first author in the Comenius University, Bratislava.

Results and discussion

Main morphological features

The adult female of *Stenochrus portoricensis* (Fig. 2A) is characterised by the following morphological features (Rowland & Reddell 1980, Reddell & Cokendolpher 1995, Tourinho & Kury 1999, Armas 2010): propeltidium with two apical setae on an anterior process arranged one behind the other and two pairs

Jana CHRISTOPHORYOVÁ, Anna ŠESTÁKOVÁ, Miroslav KRUMPÁL, Peter FEND'A, Department of Zoology, Faculty of Natural Sciences, Comenius University, Mlynská dolina B-1, SK-84215 Bratislava, Slovak Republic, e-mails: christophoryova@gmail.com, aseptakova@gmail.com, krumpal@fns.uniba.sk, fenda@fns.uniba.sk



Fig. 1: Heated greenhouses in the Botanical Garden of the Comenius University in which *Stenochrus portoricensis* occurs. A. Interior view of greenhouse. B. Detail of the stones under which females were collected. – Photos: Jana Christophoryová

of dorsal setae (Fig. 3A); corneate eyes completely absent; metapeltidium entire; movable cheliceral finger without accessory teeth (Fig. 3B), guard tooth present at end of serrula; short mesal spur present on pedipalpal trochanter (Fig. 3C); body without clavate setae; abdominal tergite II with two posterior setae; flagellum short, with three segments (Fig. 3D); spermathecae (Fig. 3E) with two pairs of asymmetric lobes, the laterals clearly shorter than the medians, both lobes with a wrinkled wall covered with small bumps, the median lobes heavily sclerotized and visible without dissection through the genital sternite, gonopod short.

At first, only juvenile specimens were collected during our research in the Botanical Garden of the Comenius University. Their identification was difficult because the majority of recent schizomid descriptions are based on the characters of adults. The juveniles were smaller and markedly less sclerotized (Fig. 2B) and were characterized by features typical for the genus (Fig. 4). The identification of the species was equivocal prior to finding the females.

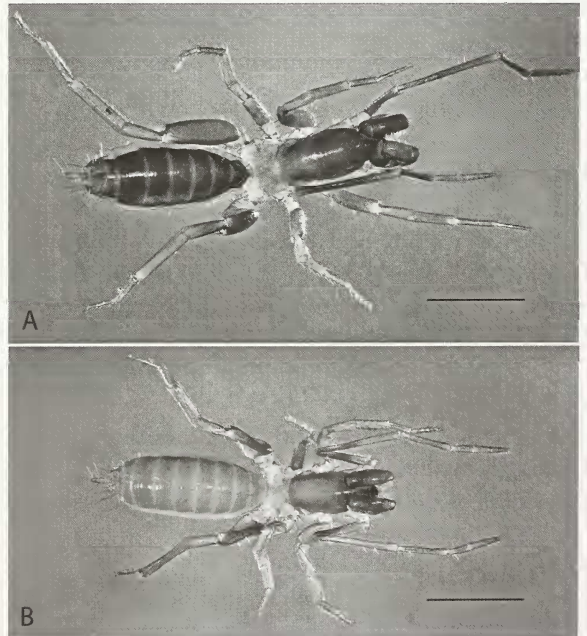
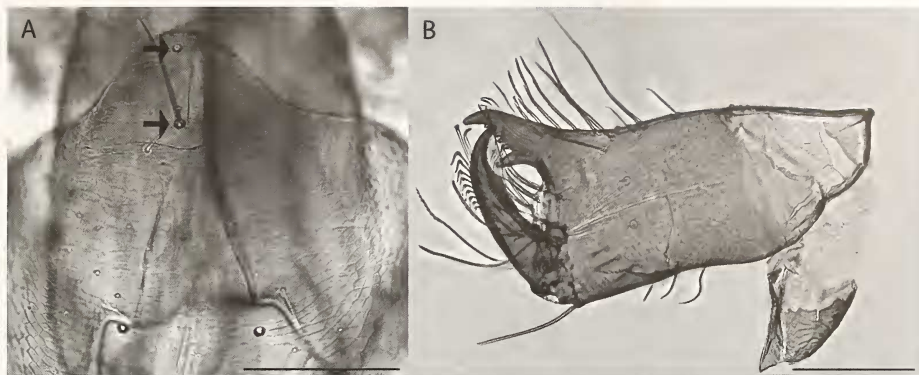


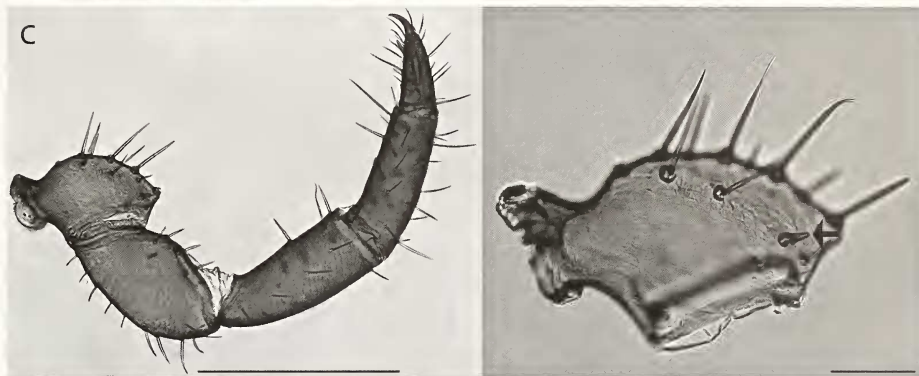
Fig. 2: *Stenochrus portoricensis* from Slovakia. A. Female. B. Juvenile. Scales: 1 mm. – Photos: Anna Šestáková

Fig. 3: Morphological characters of *Stenochrus portoricensis* female (microscope slides). – Photos: Jana Christophoryová

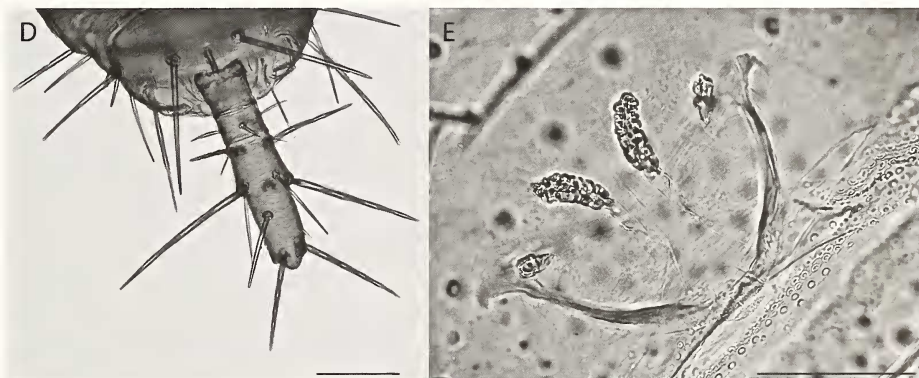
A. Detail of anterior part of propeltidium (dorsal view). Arrows point to apical propeltidial setae. B. Chelicera (lateral view). Scales: 0.2 mm (A, B)



C. Pedipalp with detail of trochanter (prolateral view). Arrow points to mesal spur on trochanter. Scales: 0.5 mm (C), 0.1 mm (C detail)



D. Flagellum (dorsal view). E. Spermathecae (dorsal view). Scales: 0.1 mm (D, E)



Natural history

Stenochrus portoricensis naturally occurs in Mexico and the Caribbean, but has been introduced to many other countries (e.g. the USA, Rio de Janeiro in Brazil, Colombia, Ecuador, the Canary Islands, Great Britain and the Czech Republic) (Reddell & Cokendolpher 1995, Tourinho & Kury 1999, Harvey 2003, Korenko et al. 2009, Kury et al. 2010). The majority of the males are known from southern Mexico, but some have been found on Caribbean Islands (Tourinho & Kury 1999). The species is fac-

ultatively parthenogenetic (Martín & Oromí 1984) and only females and juveniles have been found in heated greenhouses (Cloudsley-Thompson 1949, Korenko et al. 2009). Parthenogenesis in this species probably facilitates its importation. This species has been reported from caves, under rocks, in leaf litter and soil, in both synanthropic and disturbed habitats (Rowland & Reddell 1980, Martín & Oromí 1984, Reddell & Cokendolpher 1995, Tourinho & Kury 1999, Santos et al. 2008, Armas 2010). Some specimens have been collected in association with

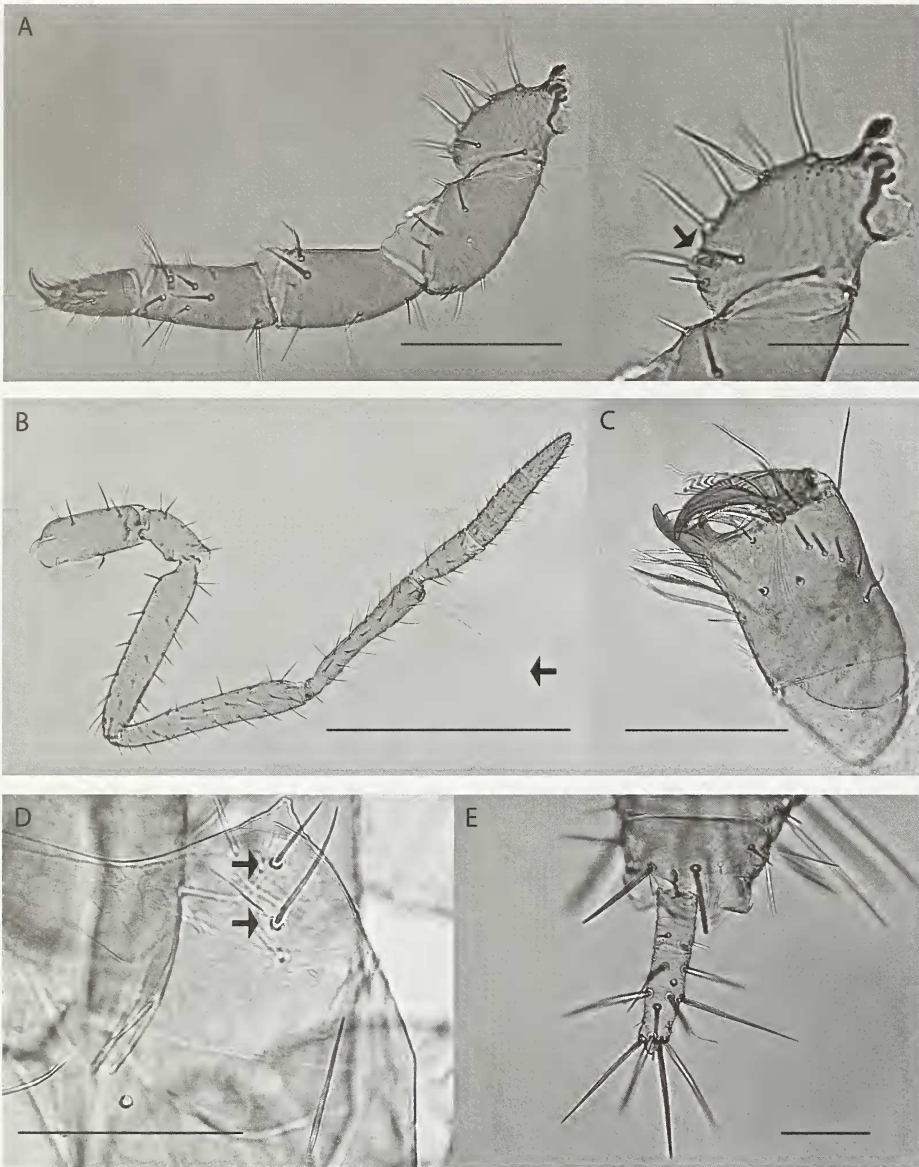


Fig. 4: Morphological characters of *Stenochrus portoricensis* juvenile (microscope slides). – Photos: Jana Christophoryová

A. Pedipalp with detail of trochanter (prolateral view). Arrow points to the mesal spur on trochanter. Scales: 0.2 mm (A), 0.1 mm (A detail)

B. Leg I (lateral view). Arrow points to one of the trichobothria on tibia. C. Chelicera (lateral view). Scales: 0.5 mm (B), 0.2 mm (C)

D. Detail of anterior part of propeltidium (dorsolateral view). Arrows point to apical propeltidial setae. E. Flagellum (dorsal view). Scales: 0.1 mm (D, E)

ants and termites (Martín & Oromí 1984, Reddell & Cokendolpher 1995, Santos et al. 2008). In Tenerife, only females are known from volcanic pit at low altitude (Martín & Oromí 1984, Oromí & Martín 1992). In the Czech Republic, the species was found under pieces of bark lying on wet soil in a greenhouse in the Botanical Garden of Masaryk University, Brno (Korenko et al. 2009).

The records provided in the current study are consistent with known natural history patterns. *Stenochrus portoricensis* occurs in Slovakia in heated

greenhouses, with a temperature of about 26 °C, in the soil and under stones. There have not been importations of plants from tropical areas or other botanical gardens for several years and some insecticides have been regularly applied one to two times per month (Vertimex, Confictor, Omite). According to these facts, the population of *S. portoricensis* can probably survive in the greenhouses. Only females and juveniles were collected, which implies that the Comenius University population of this species is probably parthenogenetic.

Acknowledgements

The authors would like to thank the director of the Botanical Garden of the Comenius University, Dr. Jaroslav Bella, and his staff for permission to collect the schizomids. We would also like to express our thanks to Alica Christophoryová for technical assistance with the figures, Katarína Krajčovičová for help with collecting schizomids and Viera Jánošková for translating Spanish papers. The advice and help of our colleagues Stanislav Korenko and Mark Harvey are also appreciated.

References

- Armas LF de 2010 Schizomida de Sudamérica (Chelicerata: Arachnida). – Boletín de la Sociedad Entomológica Aragonesa 46: 203-234
- Blick T 2006 Zwerggeisselskorpione in Europa and auf den Kanarischen Inseln. – Internet: <http://spinnen.calistatus.de/Schizomida.pdf> (accessed 2012 Dec. 03)
- Cloudsley-Thompson JL 1949 Notes on Arachnida. 11. Schizomida in England. – Entomologist's Monthly Magazine 85: 261
- Cokendolpher JC, Blick T, Bellmann H & Schrameyer K 2006 Schizomida, short-tailed whipscorpions (Arachnida) introduced into Europe – request for specimens, references & information. – Newsletter of the British arachnological Society 107: 14
- Harvey MS 2003 Catalogue of the smaller arachnid orders of the World: Amblypygi, Uropygi, Schizomida, Palpigradi, Ricinulei and Solifugae. CSIRO Publishing, Collingwood, Victoria, Australia. 385 pp.
- Harvey MS 2007 The smaller arachnid orders: diversity, descriptions and distributions from Linnaeus to the present (1758 to 2007). – Zootaxa 1668: 363-380
- Korenko S, Harvey MS & Pekár S 2009 *Stenochrus portoricensis* new to the Czech Republic (Schizomida, Hubbardiidae). – Arachnologische Mitteilungen 38: 1-3 – doi: 10.5431/aramit3801
- Kury AB, Chagas-Jr A, Giupponi APL & González AP 2010 Amblypygi, Opiliones, Schizomida, Scorpiones and Chilopoda, Tocantins, Brazil. – Check List 6(4): 564-571
- Martín JL & Oromí P 1984 Consideraciones sobre la presencia de *Schizomus portoricensis* Chamberlin, 1922 (Arach. Schizomida) en cuevas de Tenerife (Islas Canarias). – Boletín de la Sociedad Entomológica de España 8: 265-270
- Monjaraz-Ruedas R 2012 A new species of the schizomid genus *Stenochrus* (Schizomida: Hubbardiidae) from Mexico. – Zootaxa 3334: 63-68
- Oromí P & Martín JL 1992 The Canary Islands subterranean fauna. Characterization and composition. In: Camacho A.I. (Ed.): The natural history of biospeleology. Monografías Museo Nacional de Ciencias Naturales. Graficas Mar-Car, Spain. pp. 527-568
- Reddell JR & Cokendolpher JC 1995 Catalogue, bibliography and generic revision of the order Schizomida (Arachnida). – Texas Memorial Museum, Speleological Monographs, Austin 4: 1-170
- Rowland JM & Reddell JR 1980 The order Schizomida (Arachnida) in the New World. III. *Mexicanus* and *pecki* groups (Schizomidae: *Schizomus*). – Journal of Arachnology 8: 1-34
- Santos AJ, Dias SC, Brescovit AD & Santos PP 2008 The arachnid order Schizomida in the Brazilian Atlantic Forest: a new species of *Rowlandius* and new records of *Stenochrus portoricensis* (Schizomida: Hubbardiidae). – Zootaxa 1850: 53-60
- Tourinho AL & Kury AB 1999 The southernmost record of Schizomida in South America, first records of Schizomida for Rio de Janeiro and of *Stenochrus* Chamberlin, 1922 for Brazil (Arachnida, Schizomida, Hubbardiidae). – Boletim do Museu Nacional, N.S., Zoologia 405: 1-6